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Horava–Lifshitz gravity in (3+1) dimensions coupled with anisotropic matter and possible constraints from GRB 170817A

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In this talk, we shall present our recent studies on a (3+1)-dimensional Hořava-Lifshitz gravity coupled with an anisotropic electromagnetic (EM) field. This model is generated by a Kaluza-Klein reduction of a (4+1)-dimensional Hořava-Lifshitz gravity and it exhibits a remarkable feature that the gravitational waves and the electromagnetic waves, in spite of Lorentz invariance violation, have the same velocity. This feature makes it possible to restrict the parameters of the theory from GRB 170817A. In this talk we use this feature to discuss possible constraints on the parameter in this model. We analyze the potential Lorentz invariance violation effect of the GRB 170817A by analyzing potential time delay of gamma-ray photons in this event. It turns out that it places a stringent constraint on this parameter. In the most ideal case, it gives $|1 - \sqrt{\beta}| < (10^{-19} - 10^{-18})$.

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